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COUNTER-AIR OPERATIONS:
Doctrine for Littoral Operations

By

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The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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Joint and service counter-air doctrine is examined against historical performance. This examination reveals that counter-air doctrine is inadequate and requires modification to support the maritime and littoral focus required by the Joint Chiefs of Staff. Specifically, counter-air doctrine must be updated to incorporate anti-ship cruise missile and ballistic missile threats to forces operating in littoral regions. This modification to doctrine is required to ensure the services include the counter-air mission as they organize, train and equip forces, and to ensure operational commanders understand the scope of the counter-air task.

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Abstract of
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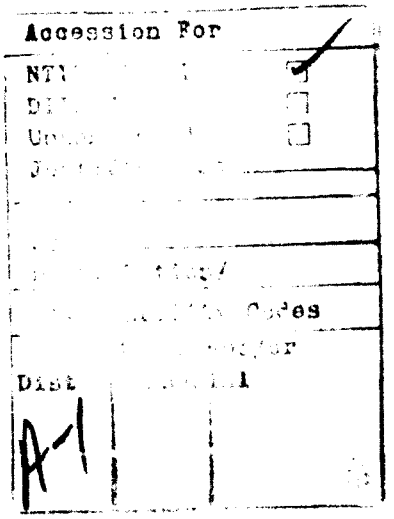

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CHAPTER I

INTRODUCTION

The Problem. As the size of the United States military is reduced, commanders must have current doctrine to support efficient employment of their limited assets. In counter-air doctrine, existing concepts must also be objectively reviewed from the Joint Chiefs new operational perspective. The Chairman of the Joint Chief of Staff has directed doctrine drafters to provide joint guidance on nuclear campaign operations, maritime and littoral operations, and operations short of war.[1] Each service is revising its vision to support these types of operations.

The White Paper, "From the Sea," refocuses the Navy's mission to support National Security Strategy 'from' the sea, as opposed to 'on' the sea. "The Navy and Marine Corps will now respond to crisis and can provide the initial, 'enabling' capability for joint operations in conflict . . ."[2] The scope of the missions encompassed in the White Paper is broad, ranging from opposed amphibious landings to (more benign) freedom of navigation exercises. This focus for operations directly supports the Joint Chiefs' direction.

Doctrine must be flexible enough to apply across the spectrum of possible scenarios. In a worst case situation, United States

armed forces will have to secure a hostile beachhead which may be expanded to a land campaign. More likely, and with a less clearly defined threat, will be the broad spectrum of "near shore" operations. Anyhow, naval forces operating in proximity to shore will be at higher risk than they would be on the open ocean as anticipated under the superseded Maritime Strategy.

The proliferation of cruise and ballistic missile technology threatens all near shore operations, whether an amphibious landing force or a joint logistics operation "over the shore," and places high demand on a sophisticated counter-air and ballistic missile defense system.

This paper identifies a gap in existing Joint Service and Navy counter-air doctrine, provides analysis of historical examples, and offers a planning approach to solving the problem. The gap in counter air doctrine concerns the air defense of naval vessels operating in proximity to potentially hostile land mass and forces in littoral areas. Existing counter air doctrine, which has expanded little to account for technological developments since World War Two, is inadequate. Specifically, neither Joint nor Naval doctrine provides a concept of operations for counter-air support of forces (other than complete carrier battle-groups) conducting littoral operations, threatened by a modern force. Inadequate doctrine has resulted in mis-allocation of forces to the operational commander, and poor readiness of the best suited forces.

Analysis of the air defense systems and naval operations in

the Pacific Theater of Operations during the Second World War, in the landings at Inchon, in the British effort to retake the Falkland Islands in 1982, and in Operation Desert Shield/Storm provides the basis for defining both the scope of the problem and the solution. This solution provides an integrated area air defense (counter-air) concept which applies across the spectrum of conflict/commitment. The concept must be flexible enough to expand or shrink as the threat shifts during an operation or campaign, within the capability of existing force structure, and an integral element of training.

CHAPTER II

NEAR-LAND OPERATIONS

Definition of Missions and Tasks. Littoral operations, which by nature require naval forces to operate in proximity to land, include mine clearance, freedom of navigation operations, amphibious operations, and logistic movement across a shore in support of land operations. Naval forces while capable of operating in this environment have not been attuned to the nuances which differentiate near-land and littoral from open ocean operations. The near-land/littoral operating environment while conceptually the same is effectively different from the open ocean environment. In either environment, the commander must gain and maintain control of the terrain to protect the force from air, surface and subsurface threats. Execution of the commander's plan will require different tactical approaches because of the terrain effects on search capabilities and response time.

Response time is the greatest concern when planning the counter-air effort because of the potential speed of the threat. Because surface and subsurface threats are sufficiently slow that existing search and tracking methods are adequate, this paper will discuss the air threat. Any air threat which might result from surface or subsurface units engagements is covered in this discussion. A review of issued, 'final draft', 'draft' and 'test' joint publications suggests that technological changes which have affected response time and counter-air capabilities have been

ignored. The counter-air doctrine outlined for joint operations in the governing publication, Doctrine for Joint Theater Missile Defense, Final Draft JCS Pub 3-01.5, reflects an individual service approach stressing the requirement for close coordination between component commanders: "Component-to-component coordination may be required in some situations due to compressed time lines and short reaction times inherent in JTMD operations."[1] Counter-air responsibilities are divided and command is fractured. Responsibility for resolution of component conflicts lies at the highest level - the operational commander!

The built in fragmentation of efforts suggests that the existing counter-air doctrine and practice do not account for the complexity of the problem nor for the change in threat since World War II. The spectrum of airborne threats to friendly forces has expanded from aircraft using iron bombs to include cruise missiles launched from a multitude of platforms and ballistic missiles with a variety of warheads. Without a doctrine to plan with and train to, the ability to execute effectively the counter air portion of a littoral campaign is in question.

Air Threats - Aircraft, Cruise Missiles and Ballistic Missiles. The airborne threat to friendly forces at the sea/land interface is much higher than in the open ocean. In an open ocean environment, the air threat is usually limited to discrete sectors for aircraft and air-launched cruise missiles. An open ocean air threat from surface and submarine launched cruise missiles is low because this technology has not proliferated to Third World

countries; and, the threat from land-launched cruise missiles and ballistic missiles is negligible. Near the shore, naval forces are vulnerable to attack from the complete spectrum of air threats. Aircraft, operating from either distant or proximate airfields, provide a 360 degree threat. Shore, air or surface launched cruise missiles (submarine launched cruise missile technology will soon proliferate and add this threat) provide a fast, low profile, difficult to counter threat. Ballistic missiles, targeted at the geographic area to which the naval forces are constrained to accomplish their mission, add the latest dimension to the threat.

Existing counter-air doctrine was adequate to provide a defense when the threat was limited to low performance (by today's standard) aircraft attempting to deliver iron bombs. Tacticians and strategists developed and perfected the amphibious doctrine with its imbedded air defense doctrine during the many campaign and operations in World War II. Analysis of the Pacific Theater island hopping campaign suggests that the air defense system developed and employed before the Ryukyu's Campaign, successfully eliminated the effectiveness of aircraft as a threat to landing forces and support ships. This conclusion, from a 1943 after-action report, shows the basis of the accepted doctrine: "It is believed that with our preponderance of carriers and superior airmanship it is possible to establish mastery of the air at any given time and place . . ."[2] This World War II doctrine used a layered defense which included attack carriers fighting a distant battle to eliminate or reduce the enemy's aircraft capabilities by sinking his carriers and

attriting his aircraft inventory.[3] Escort carriers, operating in direct support of the landing, provided light fighter cover, to shoot down the few aircraft which did attack from enemy carriers, and to counter the enemy's land-based aircraft. In the event the enemy did succeed in penetrating the fighter cover, the large number of escort cruisers and destroyers destroyed the aircraft with massed naval gunfire. The post action report for the Solomon's operation reflects the typical performance: "The brilliant performance of our fighter cover and Fighter Direction Group who successfully turned back or completely broke up the concerted attacks of four separate groups of enemy planes [sic]. Without such effective air cover, severe losses or even failure of the operation may have resulted."[4] Note that this conclusion predates the Ryukyu's operations when losses were incurred to a new air threat.

The pre-Ryukyu's lessons of World War II are incorporated in today's doctrine as "provide enough aircraft for air superiority."[5] Friendly fighter aircraft are to destroy the enemy's attack aircraft before they attack/bomb the naval force or launch cruise missiles. This idea is central to the Navy's layered Anti-Air Warfare (AAW) defensive doctrine. Fighters are deployed far ahead of the naval force to "shoot the archer" in an 'outer air battle.' Surface ships provide counter-air missile and gun systems to destroy 'leakers' (enemy aircraft which penetrate the outer air battle defensive zone.) While this doctrine was adequate for the World War II scenarios, and probably would have been adequate for

a U.S. versus Soviet ocean war, the doctrine does not adequately provide for the protection of naval forces in peacetime. The doctrine assumes that the United States is at war and that rules of engagement will allow preemptive strikes on land-based missile launch sites, or surface ships and aircraft demonstrating 'hostile intent' within their weapon's range. This approach does not provide for the effective defense required before the enemy makes his intentions clear or war is declared. For the doctrine to be effective, the rules of engagement (ROE) must allow preemptive strikes.

Compounding the inadequacy of existing doctrine, which requires extensive fighter aircraft to accomplish the counter-air mission, is the ongoing reduction in forces, particularly naval forces. How do naval forces, operating as 'Maritime Action Groups,' protect themselves from an air threat if aircraft carrier or support Air Force counter-air fighters are not available? In an environment of complex threats, a solution to this basic question is essential to support today's From the Sea focus.

A doctrine which has been adequate for fifty years falls short today because the proliferation of technologically advanced weapons has changed the threat, and naval operations are being redirected to a new operating environment. Near shore operations since the landings at Okinawa, have been unopposed by a credible air threat.[6] Major operations, such as the amphibious landing at Inchon, were conducted without threatening air power. North Korean air power in the Inchon/Seoul area was limited to "some 19 propeller-driven YAKs

and Stormoviks."[7] Reflecting a U.S. doctrine and planning failure, the only North Korean air attacks were unopposed: "A YAK-3 and a Stormovik IL-10 made for the flag ship" before the landing, and missed. The fleet had been caught "flat-footed" but was unharmed.[8]

Amphibious planning, the only near shore operations for which extensive planning and exercises have been conducted, has excluded consideration of credible air threats. Air superiority has been assumed before amphibious force arrival in the Area of Operations (AOA). This point is singled out in Colonel M.H.H. Evans' Amphibious Operations, a detailed study of current amphibious doctrine: "The amphibious forces would be working within the umbrella of theater air and maritime defenses and, indeed, of the one or more powerful carrier battle groups of the striking fleet."[9] Evans' conclusion that "Local maritime and air superiority are essential for the passage of the force and the landing"[10] is part of the prerequisite condition delineated in the Joint Doctrine for Amphibious Operations (JCS PUB 3-02): ". . . an amphibious task force should have reasonable assurance of . . . freedom from effective interference by enemy surface, subsurface, and air or ground forces from outside the objective area."[11]

Freedom of Navigation operations have been conducted either by small units capable of air defense (for example, two guided missile destroyers steaming in contested waters along the coast of Vietnam) or, if the threat credible, by large carrier formations ready to respond with major force as in the Gulf of Sidra. During the Gulf of Sidra freedom of navigation demonstrations, surface ships did

not cross the 'Line of Death' until carrier launched fighter aircraft were overhead.[12] As tensions increased, the force expanded to three carriers to provide the requisite continuous air cover.[13]

The failure to adapt doctrine has not been without casualties. The Royal Navy counter-air doctrine is identical to that of the United States. During the Falkland Island operation, the British forces suffered extensive damage and loss on the receiving end of Argentinean air power. The losses to British naval forces are staggering, considering the Argentine capabilities. Four British warships were sunk, many more damaged, and a commercial transport, the *Atlantic Conveyor,* sank after being damaged by an Argentine Exocet missile. *ad the Argentineans attacked the more vulnerable and essential transport ships instead of the warships, the British would not have recaptured the islands, or at least not as easily. Loss of the helicopters aboard Atlantic Conveyor* reduced British ground force mobility by excluding any significant movement by helicopter.[14] Further losses to critical supplies could easily have turned the outcome of the entire operation in favor of Argentina. The British used Harrier aircraft to do the counter-air mission following the prevailing doctrine, but they were ineffective at achieving air control or superiority.[15] Both attack aircraft and cruise missiles passed through the Harrier and surface-to air missile defenses to their targets.[16]

In view of the counter-air failures at Inchon and the Falkland Islands, the lessons from the Okinawa Campaign need to be reviewed.

After a series of unopposed (from the air) landings, the naval force at Okinawa suffered extensive loss and damage at the receiving end of Japanese air power. The new weapon for which existing doctrine (the very same doctrine in place today) proved inadequate was the 'Baka,' Kamikaze, or suicide aircraft. In his after action report the commander stated:

> *"Throughout this operation, the major threat to our naval forces came from the enemy suicide aircraft attacks. Some bombing and torpedo attacks were made, but most of the serious damage was received from suicide attacks. That the large majority of such planes did not reach the inner areas and that sufficient losses were not incurred is due to the excellent performance of combat air patrols and fighter direction teams, to the highly commendable work of destroyers and small types in radar picket stations and screens, and to the tendency of the enemy to concentrate his attacks on outlying stations. Defense against suiciders has not been perfected and they remain a major threat. The best defense is destruction before they launch or by the CAP before they reach their targets. Those which can evade CAP must be made to penetrate a large volume of fire from all guns which bear . . . The volume of fire cannot be discontinued when the attacker bursts into flame, but must continue until he disintegrates or crashes into the sea. Some planes of several making a coordinated attack on the same target will be successful, unless all attackers are taken under fire by all ships within range. It is noted that a study of defense against suicide attack has been directed by Commander in Chief, United States Fleet."*[17]

This Kamikaze lesson from Okinawa reflects most accurately the condition of current air defenses, if a parallel is drawn between the Japanese suicide aircraft and anti-ship cruise missiles. The prevailing doctrine was effective, with naval gunfire and fighters, in destroying inbound bomber type aircraft, but ineffective in preventing the suicide planes from hitting the ships. The suicide plane was a flying bomb which used a man as the 'computer' and 'terminal guidance system,' a precursor of today's computer controlled and radar, or infrared, guided anti-ship cruise missiles. Kamikazes were a new and difficult threat to counter. Today's anti-ship cruise missiles (ASCM) are even harder to detect

and destroy.

Cruise missiles are an inexpensive and lethal option for use against naval forces. Fortunately, their effectiveness is limited since fielded designs for cruise missiles, such as Exocet, have difficulty discriminating targets near land. On the other hand, technology provides multiple alternatives (including infrared discriminators which have already been fielded) for designs which can incrementally improve the capability of anti-ship missiles to select a valid target in the near land environment. The operational commander cannot rely on a missile to malfunction because it is operating near land. Compounding the commander's concern should be the availability and diversity of anti-ship cruise missiles on the global weapons market. Current designs include missiles which can be launched from mobile land sites, a variety of fixed and rotary wing aircraft and surface craft. Soon, submarine launched anti-ship missile technology will also proliferate. The naval forces must have an integral defense system to counter the cruise missile threat.

Naval forces operating near land, ill equipped for counter-air operations in the aircraft and cruise missile threat environment, face an additional threat - the ballistic missile. Desert Storm displayed the vulnerability of land forces to ballistic - SCUD - missiles. These ballistic missiles can also pose a significant threat to Naval Forces. Ballistic missiles, while not directly threatening to specific ships or units, are targeted at the area of operations. Equipped with a conventional warhead, the

effectiveness of a ballistic missile strike is very limited and only psychological. Equipped with a chemical, biological or nuclear warhead, a ballistic missile threat could well stop or prohibit a littoral operation.

Consider the ballistic threat to the logistics facilities at Daman or Al Jabar during Desert Shield/Storm. Despite the 'traditional' counter-air defense provided by United States and Saudi Air Forces during the early stages of the buildup, the ports remained vulnerable to ballistic missile attack. Neither Army, Air Force nor Navy/Marine Corps doctrine ever considered the threat. Closure of these two vital port facilities would have changed the nature and timetable of the entire operation. While improvements to the Patriot missile system may make that the best weapon to protect a port or installation, the Patriot system is land based and assumes friendly control of the landmass. The operational commander must have a seaborne ballistic missile defense system which can provide effective area defense.

Effective Counter-air Plans. As friendly forces are increasingly required to operate in proximity to hostile land and within the offensive reach of hostile naval air and ground forces, the ability of land or sea based air to provide adequate defense against all three threats will depend greatly on the size of the air component and on the physical environment. Air power alone can neither indefinitely support such operations, nor defend surface ships from missile attacks. The effectiveness of aircraft to counter cruise missiles is very limited. The existing Navy

philosophy is to "shoot the archer, not the arrows." But, the archer can only be attacked under certain rules of engagement which may not allow preemptive 'archer' destruction. Whether operating close to unfriendly land or in open waters, United States policy will normally preclude first strikes which would escalate a conflict.

The alternative to eliminating the archer, is to provide an active counter-air defense system for those forces. The forces operating in proximity could be equipped to provide for their own defense; however, the nature of the operations and the cost of providing each vessel with a completely self contained defensive system makes this option unfeasible. Mine clearance vessels, for example, cannot afford the increase in magnetic signature, nor are they large enough to support an effective air defense system.

While the effectiveness of the Patriot missile systems during Desert Storm is an open issue, surface to air missile systems may be the most reasonable solution to the ballistic missile threat. Surface ship missile systems, which were specifically designed to counter the cruise missile and aircraft threat, can be adapted to provide a ballistic missile defense. By modifying doctrine, adequate air defense can be provided by guided missile cruisers or destroyers with area defense missile systems.

Requirement for new Doctrine. Early detection and rapid response are the essential ingredients for successful anti-ship missile defense. Both ingredients will exist only if the planner remembers to consider, and understands, the requirements. Only

clear doctrine, well promulgated and trained to, can ensure that planners do not underestimate the importance of the counter-air effort. Only through repeated application of the doctrine will the limitations of each unit's capabilities be understood and techniques and procedures be developed to minimize the effects. Without an accurate doctrine to define the task, services will not allocate units to do the mission, operational commanders will not plan to assign the required units, and operators will be unfamiliar with the mechanics. Doctrine solves the operational problem by driving funding for training and allocation of resources.

CHAPTER III

AREA COUNTER-AIR DOCTRINE OUTLINE

Purpose of Doctrine. A critical element of operational planning is the counter-air effort. As developed in the previous chapter, counter-air planners in all future near land/littoral operations must consider aircraft, cruise missile and ballistic missile threats. The goal of an effective counter-air doctrine must be to provide a standard framework from which to consider the scope and nature of the task and derive a feasible, suitable and acceptable plan. System capabilities, procedures and command relationships must all be combined in a flexible and responsive manner that will result in a synergistic relationship. This chapter provides an outline for counter-air operations, adapted, in large part, from the Marine Corps' doctrine for air defense of amphibious operations. Chapter IV provides discussion and consideration for application of this outline. The success or failure of naval operations will depend on the effective employment of counter-air capabilities.

Counter-air Planning. Planning starts with definition of an operating area. In an amphibious operation, the amphibious operating area (AOA), for example, defines the extent of the air defense responsibility.[1] The staff must identify critical assets within the area of operations. John Ryan describes critical assets: "Critical assets are those facilities or other elements that serve a vital role in accomplishing the total mission. The

loss or severe damage of a critical asset would result in a situation where accomplishment of the mission is in jeopardy."[2] For JLOTS, the critical assets could be port facilities and transport ships; for mine clearance operations, the critical assets might be the mine hunting ships and mine countermeasure aircraft operating platforms; for freedom of navigation exercises, the critical assets might be the ships in transit. Critical assets, operating or located in the area of operations, define the scope of the counter-air task. The area, which requires an effective counter-air defense, will either be fixed geographically, or move with mobile critical assets. The next step is to learn the nature of the threat.

Identifying the Threat. Identification of the threat is central to both developing and executing the ounter-air plan. Provided from intelligence sources, the assessment of the threat allows the operational commander to choose and task the necessary forces. The intelligence assessment also provides the planner with information from which he can determine concerns in the rules of engagement (ROE). Typically, the intelligence assessment will provide information concerning the enemy's order of battle - types of aircraft, ordnance, cruise missiles and ballistic missiles which the potential adversary can field. The assessment should also provide the disposition and possible future disposition of these assets. Some sources, such as satellite warning systems and airborne electronic surveillance aircraft, may be controlled outside the theater of operations. These elements must be

integrated into the command structure to ensure queuing of the operational forces. With the area of operations defined, the critical assets decided, and an understanding of the enemy's order of battle, the planner can design the counter-air plan. Continuous monitoring of the enemy's force dispositions provides the operator with information to ensure efficient execution of the plan.

Elements of Counter-Air Operations. The Marine Corps uses three elements of Marine air defense for planning purposes - offensive AAW, active air defense and passive air defense.[3] In current 'Joint' terms these are interdiction, and active and passive counter-air operations. These three elements provide a useful means of defining the counter-air effort. The basic task of any counter-air effort in support of operations is to prevent effective enemy attacks on friendly forces as they do their mission. Three separate threats comprise the total threat, aircraft on bombing or strafing missions, cruise missiles launched from a variety of platforms and locations, and ballistic missiles.

Interdiction. When rules of engagement allow, the counter-air planners must ensure targets which are suitable for air interdiction are included in the target list, assigned to special operations forces, or included in the naval gunfire plan. Interdiction extends the Navy's 'shoot the archer' concept to destruction of the air threat at the launch site. Interdiction in support of the counter-air effort requires a focus on the enemy's potential air threats. Typical targets for air interdiction will be: Ballistic missile launch, storage and manufacturing sites;

land based cruise missile launch, storage and manufacturing sites; aerodromes; air fields; and, naval units in port. The interdiction effort should also consider enemy surface and subsurface units which have not yet fired their cruise missiles.

The entire spectrum of interdiction assets is available to planners and should be considered, from Air Force bombers to Navy Seals, as appropriate. In interdiction, the opening concern for planners will be the extent and freedom offered by the rules of engagement (ROE). Liberal ROE which allows for significant attrition of the enemy's capability before they can threaten friendly forces and reduces the scope of the active counter-air task. If ROE is restrictive and prevents preemptive interdiction, then active counter-air capabilities must be more robust.

Active Counter-Air Operations. Active counter-air consists of two main elements - area search (threat detection) and threat destruction. To reduce the risk, friendly force dispositions should provide for continuous active counter-air operations. Active counter-air plans must provide for a layered, overlapping search of that area which will provide for adequate response time for tracking and threat destruction. Assets which will be required to ensure complete coverage will likely include airborne early warning systems, surface ship air search, and ground installation air search systems. Conceptually, the search platforms must locate and identify all possible air threats to the operating force, and then pass the data to a fire control system. The fire-control system is part of the interceptor/fighter aircraft or surface

missile firing unit's combat system.

Just as search coverage must be overlapped, the capabilities of the force must be layered to bring increasing firepower to bear as a threat penetrates the defense. Elimination of the air threat starts with interdiction at the source and ends with individual unit self-defense; however, unit self defense capabilities should not be an integral part of the area defense design.

Adaptation of the Navy's layered air defense plan is most appropriate. Designed to counter high intensity Soviet air, surface and sub-surface launched anti-ship cruise missile attacks, the concept of 'inner' and 'outer' air battles includes Fighter Engagement Zones (FEZ) and Missile Engagement Zones (MEZ). These engagement zones provide the ability to layer and tailor defensive firepower while limiting the possibility of friendly fire casualties. Use of one or more FEZ's along threat axes for hostile aircraft employs counter-air aircraft to their strength. Fighter aircraft are best suited for destruction of enemy aircraft. The fighters then provide a layer of defense against air-launched cruise missiles by destroying the 'archer,' launch platform, and bombing/strafing aircraft. MEZ's should be designed around the critical assets, dovetailed with the FEZ's. According to the Navy's counter-air doctrine, NWP 32, MEZ and FEZ's have been concentric circles around a naval force. Some innovative, but unproven, tactics also include use of smaller MEZ's within FEZ's. In the new integrated concept, the FEZ and MEZ's can be any shape and can easily conform to geographic, threat or ROE imposed

limitations. Sometimes, a FEZ may not precede a MEZ. The MEZ would then be the first layer of the active defense.

The final layer of defense is provided by individual unit self-defense capabilities. Self-defense capability alone should not be considered adequate for the counter-air effort. During the Falklands war, British commanders attempted area defense using systems designed for self-defense with dismal results. The British missile systems, which were all designed to provide point defense, proved inadequate for area defense of both the naval forces operating in support of forces ashore and the forces ashore. Losses of British warships and transports belie the effectiveness of their attempt.[4]

Typical forces used to establish FEZ's will include Navy carrier fighter/interceptors, Air Force air superiority fighters and allied or coalition fighters. Attack aircraft, such as Marine Harriers, are available, but they are of limited effectiveness and any use detracts from their primary mission. Guided missile ships, HAWK and Patriot missile batteries, together provide the backbone of the MEZ forces. FEZ force selection and employment are consistent with existing Doctrine. MEZ employment and force selection will vary from the Navy doctrine of cruise missile and aircraft defense by including ballistic missile defense. Patriot Missiles have already been used for the new mission during Desert Storm: Patriot batteries provided the only active counter-air defense capability. Now, MEZ's must include area defense guided missile ships for ballistic missile defense. The limitations on

this use are discussed in chapter IV.

The self defense capabilities of units will vary, from frigates with a capable point defense (surface-to-air) missile system, to infantry platoons or minesweepers armed with Stinger missiles. Self-defense systems are of limited use for area defense and no defense against ballistic missiles. Reducing exposure of critical assets to the air threat also reduces the scope of the counter-air task. Limiting the exposure of defenseless 'ducks' to the threat falls under the passive counter-air effort.

Passive Counter-air. The third element of the counter-air efforts, Passive Counter-air, "covers all measures that minimize the effectiveness of enemy air attack . . . it includes the use of cover, concealment, camouflage, deception, dispersion, and protective construction."[5] Passive counter-air's purpose is to deny the enemy accurate targeting data. The limits to passive counter-air efforts are only in the imagination of the planner, but the efforts must be tailored to the enemy's capabilities. Existing tactics must be carefully scrutinized to preclude inappropriate application. For example, the practice of restricting radio-frequency emissions (emission control - EMCON) may have limited utility when the force is vulnerable to observation from land or neutral shipping.

Command and Control. The best laid MEZ and FEZ's will fail without an efficient and clear command network. Existing command and communication practice has proven inadequate and the planner should anticipate difficultly in data exchange and dissemination of

commands. Once forces have been allocated, the communications structure will require close attention to ensure effective data exchange between adjacent units. The command problem is solved by adopting the Navy's Composite Warfare Commander (CWC) concept. Operational commanders delegate force defense and weapons release authority to low levels through a set of subordinate commanders. The Anti-Air Warfare Commander (AAWC) is the subordinate commander for counter-air operations. The CWC concept recognizes communications limitations and assumes that effective exchange of data will degrade during an enemy air offensive. To reduce the effect of communications failures, the AAWC, "with the tacit approval of the CWC, (the AAWC) has the authority to request and task assets throughout the task force."[6] Counter-air units have sole responsibility for counter-air operations in their assigned portion of the operating area. Control from above is exercised by 'command through negation;' each level of command allows forces to do their tasks independently, only checking actions occasionally. Operators at the lowest level understand the ROE and apply them to each circumstance with confidence. When communications are sound and the pace of operations slow, commanders and operators develop mutual confidence and understanding. This confidence through understanding allows uninterrupted conduct of operations when communications degrade. Reporting and direct control resumes when communications are restored. The existing concept practiced only by the Navy, must be expanded to incorporate all area counter-air assets. Air Force and Army doctrine, which currently does not

account for communications failures, must be modified.

The counter-air commander should be selected based on the threat and the geographic location of the area of operations, both of which may change. When the threat and area of operations are primarily naval, then command of the forces should be assigned to a naval unit. If the threat and area of operations are ashore or shift ashore, then command should be assigned to the most capable land based unit - Air Force, Army or Marine.

Flexibility Across the Spectrum of Warfare. This doctrinal approach is designed to reduce the risk of air attack to forces operating in littoral regions across the spectrum of conflict. By reviewing the tenets described above - area of operations, critical assets, threat, counter-air capabilities, and command structure - the operational planner can tailor a counter-air posture to suit the operation. These considerations for counter-air efforts should be reviewed in all near shore and littoral operations. Ships should not be assigned to any near shore mission without air defense. Marines should not be landed without provisions for air defense. Joint logistics operations across the shore should not be considered without providing an adequate defense architecture appropriate to the threat with an acceptable risk level.

CHAPTER IV

COUNTER-AIR PLANNING CONSIDERATIONS

Planning Concerns. This chapter examines the active counter-air portion of the doctrine outlined in chapter III, discusses problems, and offers some options for consideration in planning. This discussion will center on system capabilities and limitations which bear consideration when selecting forces.

The central issue in active counter-air defense is response time. The ability to destroy an inbound threat depends on the range from friendly forces at which the threat was detected, the threat's speed, the kinematic capabilities of the intercepting weapon, and the time required to process information and commands. The length of time from threat detection to threat destruction is response time.

Detection. Detection of the threat is the entering step in executing active counter-air efforts. If a threat penetrates the defenses undetected, active countermeasures are ineffective. The detection effort is challenged to the limit of system capabilities at the shore/land interface. Most existing air search systems operate poorly at the sea/land interface.* For those systems which could perform well, training for operators is limited or nonexistent - aboard ships, most operators "blank out the land to cut down clutter." Common practice has been to assign specific

*At the sea/land interface, multiple environmental factor combine to generate a large number of false (clutter) tracks which confuse both operators and radar data processing systems.

assets to search over water and different assets to search over land. The break at the shoreline also usually corresponds to the change in responsibility for counter-air operations - Navy to seaward and Air Force to landward. This separation creates a hole in the search volume, a' no man's land' at the shoreline. The data link hierarchy used in Desert Storm to cover the Arabian Gulf and adjacent land mass provides a clear example of this difficulty in establishing the counter-air 'air picture.'** Multiple links, which were established along primarily service and geographical lines, resulted in poor connectivity. Had the Iraqi Air Force been more aggressive, they might have easily penetrated the defenses.

A counter-air plan designed around system capabilities and operational requirements as discussed in chapter III, would have closed the gap at the coast. Although older search systems do function poorly at the interface, two newer systems, the Air Forces' E3A Sentry Airborne Early Warning and Command System aircraft (AWACS) and the Navy's AEGIS SPY 1B/D radars, are very capable in this region. The assignment of search systems should then logically place these two assets in the positions which require concurrent overland and over-water search. Laws of physics however must still be honored: Terrain features can obstruct a ship's line of sight. Placing a ship below a cliff face will seriously restrict the search capabilities of that ship just as an

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**Problems in maintaining a coherent 'air picture' and in maintaining control of the counter-air effort during Desert Shield/Storm are the subjects of various still classified reports. Refer to Joint Center for Lessons Learned (JCLL) documents listed in the bibliography for more details.

AWACS cannot search around mountains.

Threat speed and Weapon Kinematics. The speed of the threat influences directly two planning concerns. First, detection of faster threats must be at longer ranges than slower threats to allow for adequate reaction time. Second, faster threats, are more difficult targets, and the counter-air weapons range is reduced. As threat speed increases, counter-air systems must be more closely spaced to prevent 'holes' in the defense. While system engagement ranges are discussed by the maximum capability, these ranges are not 'cookie cutters' and change with threat speed, altitude and course. An understanding of system performance capabilities and limitations is essential to assigning appropriate forces.

Weapon Selection. For each situation and threat there is a preferred counter weapon. Interceptor and fighter aircraft are best suited to engage other aircraft. Use of a manned aircraft allows for more flexibility when responding. Aircraft crews can provide positive visual identification, and the psychological effect of the fighter's presence on the enemy's crew can deter possible hostile action. Against cruise missiles and ballistic missiles, manned aircraft are of limited or no value.

Cruise missiles are difficult targets to destroy by any means. The highest probability of successful threat destruction lies in surface-to-air missiles. The range of cruise missile threats to ships ranges from low flying missiles, such as the French made Exocet, to very high diving missiles, like the Soviet/Russian made AS-4 Kitchen. AEGIS and TERRIER, the Navy's area defense missile

systems, are well equipped, and were designed, to destroy this range of cruise missile threats.[1]

While the older, TERRIER, ships have been upgraded with and advanced combat system (New Threat Upgrade (NTU)) and can successfully engage the spectrum of cruise missiles, these ships are nearing the end of their service life and will be retired from active service soon. An additional concern about the use of TERRIER ships is the performance of the search and detection system which supports the missile system. The TERRIER upgrades are "based on existing rotating antenna radars . . . therefore inherently limited in reaction time, particularly against very-low-flying sea-skimmers . . . because each radar scans the horizon at a fixed and relatively slow rate."[2] AEGIS platforms, either destroyer or cruiser, are ideally suited to counter the cruise missile threat because of the designed search capability combined with the rapid response capability. The search radar (a Multi-function Radar) is an integral part of the missile guidance and control system. If a threatening target is detected and tracked by the AN/SPY 1 radar, then a fire control solution exists. Fire Control and surface-to-air missile system response can be tailored from a slower, deliberate manual operation which places a decision maker in the process for firing to a fully automatic mode (AUTOSPECIAL). In AUTOSPECIAL, surface-to-air missiles are fired to destroy the threatening cruise missiles without human intervention. Response time is reduced to seconds.

Patriot Missile displayed some capability against ballistic

missiles during Desert Storm. There is some debate about the effectiveness and success. One point in the debate is that the damage caused by debris from Patriot destroyed SCUD's caused as much damage as an unscathed SCUD would have. This argument can be discounted in the counter-air doctrine outlined in Chapter III. The purpose of the counter-air effort is to protect critical assets, and the Patriot missiles did that. The SCUD missiles fired during Desert Storm did not strike any critical assets; collateral damage was not incurred on militarily significant targets. The idea of ballistic missile defense using surface to air missiles appears valid. When the operational commander has control of the land mass, the Patriot system should be employed for ballistic missile defense.

When the commander does not have the luxury of land basing, ballistic missile defense must be provided by sea borne surface to air missile systems. Operational commanders are not provided with such a system. However, both Standard Missiles used with the AEGIS and TERRIER systems (SM 2 (MR)AEGIS and SM 2 (ER)) are kinematically suitable for ballistic missile defense. Unfortunately, the computer programs which control the fire control computers are currently tailored to counter cruise missiles, not ballistic missiles. Operators of both systems can bypass the computer decision process and engage targets which are 'out of bounds', but such actions are of questionable reliability. Computer controlled fire control solutions are empirically more accurate and reliable. Fortunately, computer programs are easy to

modify. Since AEGIS will be the only sea-borne area counter-air system in the near future, the ongoing effort to modify AEGIS systems to include a counter-ballistic missile capability (Block IV Standard Missile currently being considered by the Strategic Defense Initiative program) must be pursued.

A Patriot-AEGIS combination allows for optimum coverage of the operating area. AEGIS detection and tracking data can be passed via existing data links to the Patriot batteries. As planned improvements to both systems are fielded, the synergism will improve. Future data exchange improvements include the Joint Tactical Data System and possibly Link 16, high speed UHF/SHF data exchange systems. The performance of Patriot against SCUD's has been analyzed and should be reflected in the 'Super' Patriot upgrades and possibly in the Standard Missile Block IV missile for the AEGIS System.

Command and Control. All Navy active counter-air plans end at the shore. The Marine Corps has a well defined plan for air defense of the amphibious operation after the Marine Air Ground Task Force (MAGTF) has moved ashore. This plan includes the phasing ashore of first Stinger missile batteries, then Hawk missile assault fire units, followed by establishing AV-8B forward arming and refueling points and finally, stationing of Marine aviation units on seized or constructed airfields. Army plans are similar to Marine plans, but not as well developed. The Army also controls the employment of Patriot Missile batteries. The Air Force can do the mission but has deferred to the Navy for over-

water counter-air operations.

Integration of each service's capabilities, 'unity of effort,' will best be accomplished through the proposed doctrinal changes which provide 'unity of command.' The complexity of the threat and the diversity of the counter-air systems mandates that the entire effort be commanded from one location. Existing data link systems, and planned improvements, are ideally suited for a joint command structure. As discussed, the sea/land division of counter-air responsibilities creates confusion and provides for poor utilization of assets. A single commander, responsible for the entire counter-air mission, can tailor the force dispositions correctly and efficiently. By assigning all counter-air operations to one commander, the natural break disappears and divisions in search area will be more operationally sound. As discussed under 'Command and Control' in chapter III, the counter-air commander should be assigned based on the area of operations and the threat.

Summary of Considerations. Successful counter-air plan execution will rely on providing adequate response time. The search, command, control and firepower assignments recommended in this chapter are designed for maximum response time.

CHAPTER V

RECOMMENDATIONS

Chapter II illustrated the inadequacy of existing counter-air doctrine and developed the scope of the task. Chapter III outlined a concept of operations to counter the spectrum of air threats to forces operating in littoral regions. Chapter IV identified existing force limitations which will negatively affect the accomplishment of the counter-air task. This chapter summarizes the actions required to correct the deficiencies in joint counter-air operations.

Joint and Service Doctrine. The purpose of all military doctrine is to ensure forces are organized, trained and equipped to support national policy and strategy. Services use the doctrine for exactly those purposes. Tasking for operational commanders is derived from the same national policy and objectives, but operational commanders must employ the forces as provided. Doctrine therefore must be based on operational requirements and be flexible enough to ensure services build forces which will be suitable across the spectrum of conflict.

The discussion in chapters II, III and IV illustrated that the existing force structure, training and equipment are inadequate for successful counter-air missions in support of the Joint Chiefs' enumerated military objectives. The joint staff and the service staffs must update the counter-air doctrine now to ensure future modernization programs, training requirements and force allocations

do meet the counter-air requirements.

System Improvements. Services have failed to provide an adequate counter-air capability for counter-air command and control and for ballistic missile defense. While there are ongoing programs to address these issues, these programs are at risk if the demand is not supported by doctrine. By defining the operational requirement, the joint and service doctrines will provide justification for continuation of existing SHF data link programs and the AEGIS Block IV missile program.

Training. None of the forces assigned to the counter-air mission are trained for this new idea of integrated search, detection and destruction. Without doctrine, such training will not be a priority. For ballistic missile defense specifically, the capabilities inherent in and the proposed future developments for the AEGIS combat system are ideally suited. However, the ships are not yet assigned the mission, and tactics have not been developed. A change in doctrine to incorporate an AEGIS (or Standard Missile at a minimum) platform into every near land operation such as mine clearance, presence/freedom of navigation or landing area preparation operation is essential to ensure ships train to meet the new challenge.

Force Allocation. Force providers - Navy Fleet Commanders, Air Force Combat Command and Army Forces Command (FORCECOM may be an exception for assigning Patriot batteries to Army units) - are not automatically assigning the units listed in Chapter IV to operational commanders for the specific counter-air mission. In

practice, the operational commander has had to draw from in place forces to support counter-air operations on an ad-hoc basis. During Desert Storm, for instance, Patriot batteries answered the call for a ballistic missile defense system, a task for which the systems were not designed and the units not deployed or trained. In the Arabian Sea, the cruiser PRINCETON (CG 59) was assigned to provide air defense for mine countermeasure ships - a mission she was well suited for, but had not been trained to do.[*]

Summary. Counter-air operations are not singled out as a separate task for joint operations. This paper has taken the position that unless counter-air operations are planned separately and the task assigned to a single commander, the risk to all future operations, especially littoral, will be high.

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[*] AEGIS cruiser combat system capabilities makes them well suited for any littoral counter-air mission. However, PRINCETON's crew had not been trained for near land radar operations.

NOTES

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3.Ibid., p. 2-8.

4.Ibid., p. 2-17.

5.Ibid., p. 2-21.

6.John E. Ryan, "Air Defense of Amphibious Operations," Marine Corps Gazette, May 1988, p. 50.

7.Robert Debs Heinl, Jr., Victory at High Tide (Philadelphia: J.B. Lippincott, 1968), p. 30.

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